PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Ernesto Lasalandra et al.
Application No.	:	10/788,962
Filed	:	February 27, 2004
For	:	MULTIPLE-THRESHOLD MULTIDIRECTIONAL INERTIAL DEVICE

Examiner	:	Adi Amrany
Art Unit	:	2836
Docket No.	:	854063.747
Date	:	June 17, 2010

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANT'S BRIEF

Commissioner for Patents:

This brief is in response to the Final Rejection mailed December 18, 2009, and in furtherance of the Notice of Appeal, filed in this case on March 17, 2010. The fees required under Section 41.20(b)(2), and any required request for extension of time for filing this brief and fees therefor, are dealt with in the accompanying transmittal letter.

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST 4
II. RELATED APPEALS AND INTERFERENCES 4
III. STATUS OF CLAIMS 4
IV. STATUS OF AMENDMENTS 4
V. SUMMARY OF CLAIMED SUBJECT MATTER 4
  A. Introduction 4
  B. Review of Aspects of the Prior Art 5
  C. Summary of Principles of the Application 7
  D. Correlation of Claims to the Specification 12
VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL 18
VII. ARGUMENT 18
  A. Discussion of prior art references. 19
    1. U.S. Patent No. 5,173,614 to Woehrl 20
    2. U.S. Pub. 2002/0033047 by Oguchi 25
    3. U.S. Pub. 2003/0092493 by Shimizu 25
    4. U.S. Patent No. 6,738,214, to Ishiyama 25
  B. Case Law of General Relevance 25
  C. General responses to the Examiner's arguments. 26
    1. Portable electronic apparatus 26
    2. Character of the signal at L3 28
  D. Rejection of claims 1-5, 10-12, and 28-31 under 35 U.S.C. §103(a) over Woehrl, in view of APA. 29
    1. Claims 1-5 29
    2. Claim 31 34
    3. Claims 10-12 36
    4. Claim 28 38
    5. Claims 29 38
  E. Rejection of claims 6-8 and 16 under 35 U.S.C. §103(a) over Woehrl, in view of APA and Oguchi. 38
  F. Rejection of claims 13-15, 17, 18, and 21-24 under 35 U.S.C. §103(a) over Woehrl, in view of Shimizu. 38
    1. Claims 13, 14, and 18 38
    2. Claim 15 40
    3. Claim 17 41
    4. Claims 21 and 22 42
    5. Claim 30 43
  G. Rejection of claim 9 under 35 U.S.C. §103(a) over Woehrl, in view of APA and Shimizu. 43
    1. Claim 9 43
  H. Rejection of claims 19 and 20 under 35 U.S.C. §103(a) over Woehrl, in view of Shimizu and Ishiyama. 43
    1. Claim 19 43
    2. Claim 20 44
  I. Conclusion 44

VIII. CLAIMS APPENDIX.....45
IX. EVIDENCE APPENDIX.....53
X. RELATED PROCEEDINGS APPENDIX.....54

I. REAL PARTY IN INTEREST

The real party in interest is STMicroelectronics Srl, which is the assignee of the present invention.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative, and assignee are unaware of any appeals or interferences which directly affect or will be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-24 and 28-31 are pending, and claims 25-27 and 32-33 are cancelled. The rejections of all pending claims are being appealed.

IV. STATUS OF AMENDMENTS

An Appeal Brief was filed in this matter October 16, 2009,[1] in response to which the Examiner reopened prosecution and filed a non-final Office Action, mailed December 18, 2009.[2] Appellants responded with a new Notice of Appeal, filed February 17, 2010. There have been no amendments filed in this matter since prior to the first appeal brief.

V. SUMMARY OF CLAIMED SUBJECT MATTER

A. Introduction

The summary that follows includes "a concise explanation of the subject matter defined in each of the independent claims involved in the appeal," with reference to the specification by page and line number, and Figure and reference number, as required under 37 C.F.R. § 41.37(c)(1)(v). Each independent claim and each claim that includes a means plus function limitation is listed at the end of this section, and subject matter in the specification corresponding to each claimed function is set forth by reference to page and line number and, where applicable, to figure and reference number.

---

[1] Hereafter, *first appeal brief*.

[2] Hereafter, *Office Action*.

The principles of the present application are most easily understood in comparison to the prior art. Accordingly, aspects of the prior art will be reviewed prior to the discussion of the application. This summary provides a general description of disclosed subject matter on which the claims read, without attempting to identify every element of every disclosed embodiment on which any limitation of any claim reads. Nor should it be relied upon to define the scope of the claims. Instead, representative elements are set forth with appropriate explanation to assist the Board in quickly acquiring an understanding of the subject matter, sufficient to follow the arguments set forth and to arrive at an informed decision.

B. Review of Aspects of the Prior Art

As portable battery powered electronic devices have become more and more common and widely used, extending the life of the batteries in such devices has become increasingly important. One known method for doing so is to place a device on standby if it is not moved for some selected period of time. While on standby, most of the systems of the device are shut down, such as, for example, hard drive, video screen, keypad, etc., which reduces battery draw. A detection circuit remains active, and includes an inertial sensor configured to detect movement of the device. Upon movement being detected, the detection circuit reactivates the device for normal operation. Thus, battery consumption is reduced without appreciably affecting operation of the device by the user (**10:8-20**).[3]

Figure 1 of the specification is reproduced below as Figure 1 of the present brief. The Figure is a graph that shows the response of a typical linear inertial sensor and detection device that is sensitive to acceleration of the sensor in two axes, X and Y. For simplicity and clarity, acceleration in only two axes is shown and described, but operation in a third axis of acceleration is substantially identical to that described below with respect to two axes.

---

[3] For brevity, where sections or specific passages of the specification are cited, they will be indicated in bold by a page number separated from a line number by a colon, e.g., **4:22**, indicating page 4, line 22 of the specification.

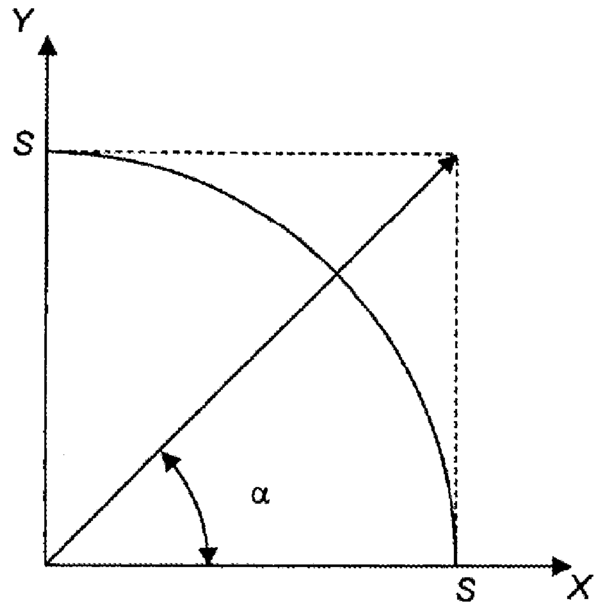

Figure 1
(Figure 1 of the specification)

Any acceleration along a vector that lies in the plane defined by the perpendicular axes X and Y includes an X and a Y component. A line on the graph at the appropriate angle represents the absolute value of a detected acceleration, with the length of the line corresponding to the amplitude, or strength, of the acceleration. The respective amplitudes of the X and Y components determine the angle and amplitude of the vector. In the example shown, the acceleration lies at a 45 degree angle, so the X and Y components are of equal strength, as shown by the dotted lines, which intersect the respective ordinals an equal distance from the zero point.

Typically, a device for reactivating a portable electronic device from standby functions exactly as represented in the graph of Figure 1. Namely, a first sensing element that is sensitive to acceleration along only one axis is positioned so that it will detect acceleration along the X axis, and a second identical sensing element is positioned at right angles to the first element, so that it will detect acceleration along the Y axis. When an acceleration occurs, signals from the sensing elements are compared to respective threshold values S to determine if a reactivation signal should be produced.

A problem associated with the sensing device represented by Figure 1 is that, while an acceleration of a magnitude S directly along one of the axes X or Y is sufficient to reactivate the device, the same magnitude of acceleration along a vector that does not correlate exactly with one of the axes X or Y may not be detected by the detection circuit because it does

not exceed the threshold of either axis. An ideal device configured would detect any acceleration that crossed the arced line of Figure 1, regardless of the vector. However, given the simple comparison arrangement discussed above, the acceleration must cross one of the dotted lines before it is detected. It can be seen that an acceleration along vector A, lying at 45 degrees, relative to the X and Y axes, must be significantly stronger than the value of S before it crosses a dotted line and is detected (**2:23-3:7**). While it is possible to calculate the actual vector and amplitude of an acceleration from the signals of the two sensing elements, in order to accurately determine when the amplitude exceeds the threshold, regardless of the angle, the power requirements for such computations would increase battery draw to an unacceptable degree.

C. Summary of Principles of the Application

Figure 4 of the specification is reproduced below as Figure 2 of the present brief.

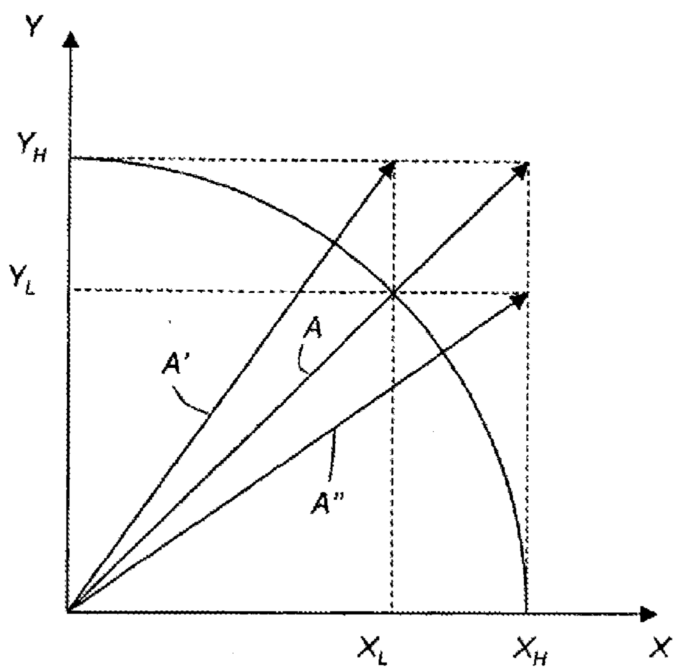

Figure 2
(Figure 4 of the specification)

Figure 2 is a graph showing the response of a linear inertial sensor and detection circuit according to a disclosed embodiment of the invention. As with the previously discussed circuit, the circuit represented by the graph of Figure 2 is sensitive to movement in either direction along two axes X and Y.

The sensing device represented by the graph of Figure 2 is configured to compare the X and Y signals to respective high (X_H, Y_H) and low (X_L, Y_L) thresholds, and to produce a reactivation signal if *either* the X or the Y signal exceeds its respective high threshold X_H, Y_H, or if both the X *and* the Y signals exceed their respective low thresholds X_L, Y_L **(9:1-9)**. In other words, if the vector line representing a sensed acceleration crosses either the line X_H or the line Y_H, the reactivation signal is produced, and the reactivation signal is also produced if the line crosses *both* of the lines X_L and Y_L. It can be seen that detection of acceleration along vector A will now be detected as it crosses the arc, and accelerations along vectors A' and A", which represent the vectors at which the greatest acceleration is required to trigger a reactivation signal, will do so at a significantly lower magnitude than along vector A using the circuit of Figure 1. In this way, the disparity between the nominal threshold value and the maximum value that may actually be required is reduced **(9:10-10:7)**.

Figure 3 of the specification is reproduced below as Figure 3.

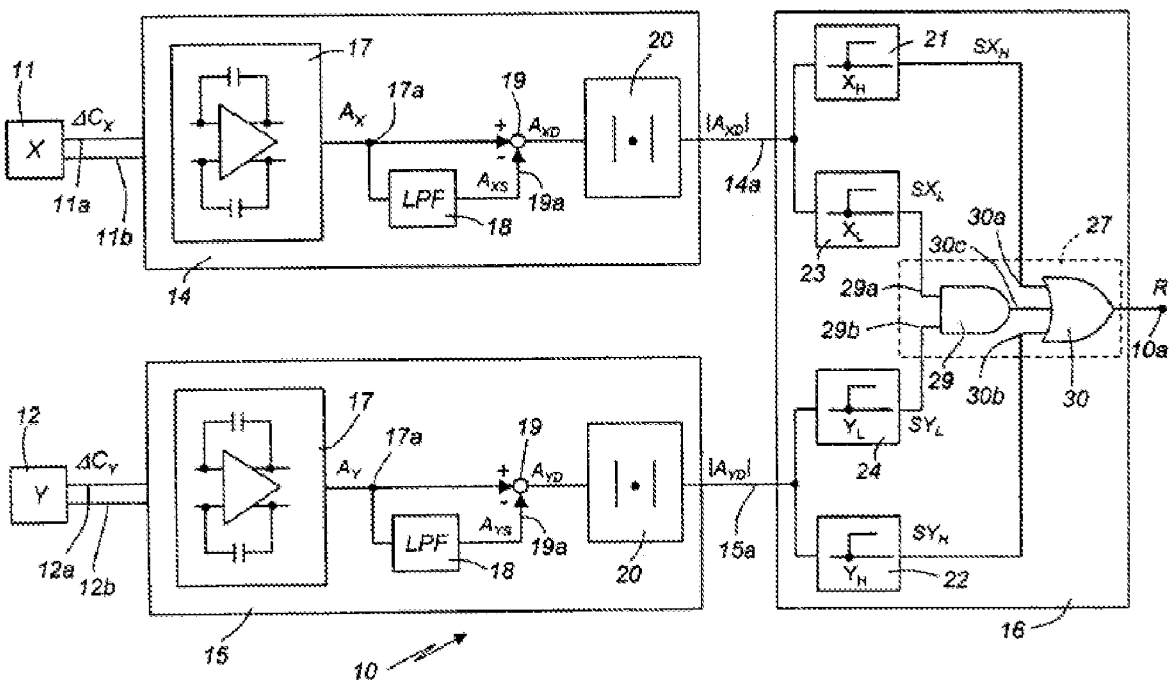

Figure 3
(Figure 3 of the specification)

Figure 3 is a block diagram of a inertial detection circuit 10, according to one embodiment, that is configured to operate substantially as described above with reference to Figure 2. The device 10 includes first and second inertial sensors 11, 12, first and second

transduction stages 14, 15, and a comparison stage 16 (**5:4-8**). The detection circuit 10 is configured to produce a recognition signal R at an output 10a (**7:22**) for reactivation from standby of a portable electronic device (**10:8-16**).

Inertial sensors 11, 12 are arranged to detect accelerations of the device 10 along X and Y axes, respectively. In this embodiment, the inertial sensors 11, 12 are micro-electro-mechanical system (MEMS) sensors such as are well known in the art (**5:9-15**).

Turning to the first sensor 11, the sensor has first and second output terminals 11a, 11b that are coupled to respective capacitive elements of the sensor. At rest, the capacitances at the terminals 11a and 11b are balanced, *i.e.*, substantially equal to each other, but when the device is subjected to acceleration in the X-axis, the capacitance of one terminal increases, while that of the other terminal decreases, producing a capacitive imbalance signal ΔC_X that corresponds in magnitude and polarity to the detected acceleration (**4:9-5:3**).

It should be noted that acceleration is commonly referred to as positive or negative, depending upon which direction it occurs along a given axis. In other words, in response to an acceleration in a first –positive – direction along the X axis, the capacitive value at the first output 11a will increase in direct relation to the strength of the detected acceleration and the capacitive value at the second output 11b will decrease in direct relation to the strength of the detected acceleration, resulting in a positive difference between the two values, or ΔC_x. Conversely, in response to an acceleration in a second – negative – direction, opposite the first direction, along the X axis, the capacitive value at the first output 11a will *decrease* in direct relation to the strength of the detected acceleration and the capacitive value at the second output 11b will *increase* in direct relation to the strength of the detected acceleration, resulting in a negative ΔC_x.

The transduction stage 14 includes a current-to-voltage converter 17, a low-pass filter 18, a subtractor node 19, and a rectifier 20 (**5:16-17**). The converter 17 is coupled to the outputs 11a, 11b of the first inertial sensor 11, and produces a voltage signal at its output, which corresponds to the difference between the capacitive values, and therefore to the strength of a detected acceleration (**5:21-27**). The filter 18 separates a continuous component from a dynamic component of the signal, passing the continuous component while blocking the dynamic component (**5:28-6:5**). The continuous component, *i.e.*, the portion of the signal that

corresponds to continuous accelerations such as gravity, is subtracted from the complete signal at the subtractor node 19. In this way, the influence of gravity on the device is cancelled, and the signal A_{XD} that remains, at the output of the subtractor node 19, corresponds to the dynamic acceleration of the device (**6:6-11**). The rectifier 20 produces a positive-value signal $|A_{XD}|$ at its output, regardless of the polarity of the signal from the subtractor node. Thus, the value of the signal $|A_{XD}|$ at the output 14a of the first transduction stage 14 is insensitive to the polarity of the acceleration, but instead corresponds to an absolute value of the dynamic component of the detected acceleration in the X axis (**6:12-15**).

In response to acceleration along the Y-axis, the second inertial sensor 12 produces, at its terminals 12a, 12b, a capacitive imbalance ΔC_Y that corresponds in magnitude and polarity to the detected acceleration in the Y axis, which is processed by the second transduction stage 15 substantially identically to the processing of the signal ΔC_X of the first transduction stage 14, to produce a signal $|A_{YD}|$ at the output 15a of the second transduction stage 15, which corresponds to an absolute value of the dynamic component of the detected acceleration in the Y axis (**6:16-7:4**).

The comparison stage 16 comprises first and second upper-threshold comparators 21, 22, first and second lower-threshold comparators 23, 24, and an output logic circuit 27, having a two-input AND gate 29 and a three-input OR gate 30 (**7:5-8**). The output of the OR gate 30 forms the output 10a of the inertial detection circuit 10 (**7:21-22**).

The signal $|A_{XD}|$ from the output 14a of the first transduction stage 14 is supplied to inputs of the first upper-threshold comparator 21 and the first lower-threshold comparator 23, while the signal $|A_{YD}|$ from the output 15a of the second transduction stage 15 is supplied to inputs of the second upper-threshold comparator 22 and the second lower-threshold comparator 24 (**7:9-15**). Outputs of the first and second lower-threshold comparators 23, 24 are coupled to respective inputs 29a, 29b of the AND gate 29, and outputs of the first and second upper-threshold comparators 21, 22 and of the AND gate 29 are coupled to respective inputs 30a, 30b, 30c of the OR gate 30 (**7:15-22**).

The first upper-threshold comparator 21 compares the signal $|A_{XD}|$ with a first upper threshold value X_H, and supplies an output signal SX_H at its output. If the signal $|A_{XD}|$ exceeds the first upper threshold value X_H, the output signal SX_H is set at a first – *e.g.*, high –

logic value, while if the signal $|A_{XD}|$ does not exceed the first upper threshold value X_H, the output signal SX_H is set at a second – *e.g.*, low – logic value (**7:23-8:2**). Likewise, the second upper-threshold comparator 22 compares the signal $|A_{YD}|$ with a second upper threshold value Y_H, and supplies an output signal SY_H at its output, set at the first or second logic value, depending on whether or not the signal $|A_{YD}|$ exceeds the second upper threshold value Y_H (**8:3-10**).

The first and second lower-threshold comparators 23, 24 process the respective signals $|A_{XD}|$ and $|A_{YD}|$ in a manner that is substantially similar to that described with reference to the first and second upper-threshold comparators 21, 22, comparing them to respective lower threshold values X_L and Y_L, and supplying output signals SX_L at SY_L at their respective outputs, each set at the first or second logic value according to whether or not the input signal exceeds the respective lower threshold value (**7:23-8:10**).

The AND gate 29 supplies the first logic value at its output only if both the first and second lower-threshold comparators 23, 24 supply the first logic value at their respective outputs. Thus, the AND gate produces the first logic value only if both of the signals $|A_{XD}|$ and $|A_{YD}|$ exceed their respective lower thresholds. On the other hand, the recognition signal R of the OR gate 30 is set at the first logic value if any one of the inputs 30a, 30b, or 30c is set at the first logic value. Thus, the recognition signal R will be set at the first logic value at the output 10a of the inertial sensor circuit 10 if both of the signals $|A_{XD}|$ and $|A_{YD}|$ exceed their respective lower thresholds, or if either of the signals $|A_{XD}|$ and $|A_{YD}|$ exceed their respective upper thresholds (**7:14-25**).

In summary, (1) if a detected acceleration in either direction along the X axis is greater than an upper X threshold, the recognition signal R at the output 10a of the inertial sensor circuit 10 will be set at the first logic value; (2) if a detected acceleration in either direction along the Y axis is greater than an upper Y threshold, the recognition signal R will be set at the first logic value; (3) if a detected acceleration in either direction along the X axis is greater than a lower X threshold, <u>and</u> a detected acceleration in either direction along the Y axis is greater than a lower Y threshold, the recognition signal R will be set at the first logic value; and (4) if none of the three previous conditions are met, the recognition signal R will be set at the second logic value (**7:14-25**).

While a two-axis inertial detector circuit is discussed in some detail above, one of ordinary skill in the art will recognize that the disclosed principles can likewise be applied to a three-axis inertial detection circuit, to provide a reactivation signal in response to movement of the device along three axes (**11:11-14**).

According to another embodiment, only one transduction stage is provided, *e.g.*, the first transduction stage 14, and the signals from the first and second inertial sensors 11, 12 are sequentially coupled to the input of the transduction stage by, for example, a multiplexer, so that both the X and Y signals are processed by the same circuit. The corresponding signals $|A_{XD}|$ and $|A_{YD}|$ are temporarily stored in a registered so they can be simultaneously provided at the corresponding inputs of the comparison stage (**11:17-22**).

As outlined above, there are several advantages provided over the prior art, according to various embodiments:

- compensation for effects of gravity and other constant accelerations, which would otherwise skew sensitivity;
- insensitivity to polarity of acceleration;
- reduced variation of sensitivity based upon a specific vector of acceleration;

Each of these elements improves the consistency of response to dynamic acceleration, regardless of vector.

D. Correlation of Claims to the Specification

Each independent claim that is involved in this appeal and each claim that includes a means plus function limitation is listed below, with the respective means plus function limitation identified by italic characters. Subject matter in the specification corresponding to each claimed limitation is set forth by page and line number, and where applicable, by figure and reference number. The figure numbers used below correlate to the numbering of the figures of the specification rather than to the figures submitted in the present brief. Thus, for example, a reference to Figure 4 in this correlation refers to Figure 4 of the original specification, which is reproduced above as Figure 2 of the present Brief.

1. A multidirectional inertial device having a plurality of preferential detection axes, comprising:

inertial sensor means, which are sensitive to accelerations parallel to said preferential detection axes (**5:9-15**; Figs. 3, 11, 12);

transduction means, coupled to said inertial sensor means and supplying a plurality of acceleration signals, each of which is correlated to an acceleration parallel to a respective one of said preferential detection axes (**5:16-7:4**; Figs. 3, 14, 15);

first comparison means, connected to said transduction means and supplying a first recognition signal when only a first of said acceleration signals is greater than a respective upper threshold and supplying the first recognition signal when only a second of said acceleration signals is greater than a respective upper threshold (first and second upper threshold comparators 21, 22 and gates 30; Figs. 3, 21, 22, 30; **7:9-8:10**); and

second comparison means, connected to said transduction means and to said first comparison means for supplying said first recognition signal when any two of said acceleration signals are each greater than a respective lower threshold, which is smaller than the respective upper threshold (first and second lower threshold comparators 23, 24, and gate 29 or gate 30; Figs. 3, 23, 24, 30; **7:9-8:10**); and

wherein the *first comparison means* supply the first recognition signal when an absolute value of a first one of said acceleration signals is greater than the respective upper threshold (**8:14-17**), and when an absolute value of a second one of said acceleration signals is greater than the respective upper threshold (**8:14, 15, 18, 19**), and the second comparison means supply the first recognition signal when the absolute value of any two of said acceleration signals are each greater than the respective lower thresholds (**8:14, 15, 20-24**).

2. The device according to claim 1 wherein said first *comparison means* comprise, for each said preferential detection axis, a respective first comparator (Figs. 3, 21, 22), which receives the respective one of said upper thresholds and receives the respective one of said acceleration signals, and at least one first logic gate (Figs. 3, 30), connected to each first comparator.

3. The device according to claim 2 wherein *said second comparison means* comprise, for each of said preferential detection axes, a respective second comparator (Figs. 3, 23, 24), which receives the respective one of said lower thresholds and receives the respective one of said acceleration signals, and at least one second logic gate (Figs., 3 29), connected to each second comparator.

6. The device according to claim 1 wherein said *inertial sensor means* comprise at least one micro-electro-mechanical sensor with capacitive unbalancing (Figs. 2, 10; Figs. 3, 11, 12; **1:10-12**, **5:9-11**).

7. The device according to claim 6 wherein said *inertial sensor means* comprise a micro-electro-mechanical capacitive-unbalance sensor for each of said preferential detection axes (Figs. 3, 10, 11; **5:4-15**).

8. The device according to claim 6 wherein said *transduction means* comprise:

at least one current-to-voltage converter, connectable to said at least one micro-electro-mechanical sensor (Figs. 3, 14; **5:18-21**);

a subtractor node, having an inverting input and a non-inverting input, the non-inverting input connected to an output of said current-to-voltage converter (Figs. 3, 19; **5:26-27**);

a filter, connected between said output of said current-to-voltage converter and said inverting input of said subtractor node (Figs. 3, 18; **5:28-6:1**); and

a rectifier, which is connected to an output of said subtractor node and supplies at least one of said respective acceleration signals (Figs. 3, 20; **6:12-15**).

9. A portable electronic apparatus, comprising:

a device for reactivation from stand-by, said device including a multidirectional inertial device that includes:

an output terminal of the device for reactivation from standby;

inertial sensor means, which are sensitive to accelerations parallel to each of a plurality of preferential detection axes (Figs. 3, 11, 12; **5:9-15**);

transduction means, coupled to said inertial sensor means and supplying a plurality of acceleration signals, each of which is correlated to an absolute value of an acceleration parallel to a respective one of said preferential detection axes (Figs. 3, 14, 15; **5:16-7:4**);

first comparison means, connected to said transduction means and supplying a reactivation signal at the output terminal when only a first one of said acceleration signals is greater than a respective upper threshold, and supplying the reactivation signal at the output terminal when only a second one of said acceleration signals is greater than a respective upper threshold; and

second comparison means, connected to said transduction means and to said first comparison means for supplying said reactivation signal at the output terminal when any two of said acceleration signals are each greater than a respective lower threshold, which is smaller than the respective upper threshold.

10. A method for detecting the state of motion of a device, comprising:

generating a plurality of acceleration signals, each of which is correlated to an absolute value of an acceleration parallel to a respective preferential detection axis (**6:14, 15; 7:3, 4**);

supplying a first recognition signal at an output terminal when only a first one of said acceleration signals is greater than a respective upper threshold (**8:14-17**);

supplying the first recognition signal at the output terminal when only a second one of said acceleration signals is greater than a respective upper threshold (**8:14, 15, 18, 19**); and

supplying the first recognition signal at the output terminal when any two of said acceleration signals are each greater than a respective lower threshold, which is smaller than the respective upper threshold (**8:14, 15, 20-24**).

13. A device, comprising:

a portable electronic apparatus (Figs. 5, 30) configured to go into stand-by after a period of inactivity and to return to an active state when a first recognition signal (R) is produced at an output terminal (Fig. 5, 10a; **10:10-16)**, including:

an acceleration circuit configured to produce a dynamic acceleration signal corresponding to a level of acceleration in each of a plurality of detection axes (Figs. 3, 11, 12, 14, 15);

a comparator circuit for each of the detection axes, configured to compare the respective dynamic acceleration signal with respective higher and lower threshold signals (Figs. 3, 21, 22, 23, 24); and

a logic circuit configured to produce a first recognition signal at the output terminal if the dynamic acceleration signal of only a first one of the plurality of detection axes exceeds its respective higher threshold, if the dynamic acceleration signal of only a second one of the plurality of detection axes exceeds its respective higher threshold, and if the dynamic acceleration signals of any two of the plurality of detection axes exceed their respective lower thresholds (Figs. 3, 27, 29, 30).

21. A method, comprising:

sensing acceleration of a device in each of a plurality of axes (**5:9-15**);

comparing respective levels of the acceleration in the axes with a high threshold (**9:10-12**);

comparing the respective levels of the acceleration in the axes with a low threshold (**9:10-12**);

producing a first recognition signal if the level of the acceleration with respect to only a first one of the plurality of axes exceeds the high threshold (**8:14-17**; **9:12-14**);

producing the first recognition signal if the level of the acceleration with respect to only a second one of the plurality of axes exceeds the high threshold (**8:14, 15, 18, 19**; **9:12-14**);

producing the first recognition signal if the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold (**8:14, 15, 20-24**; **9:14-16**);

deactivating a device to a stand-by status in response to a period of inactivity of the device (**10:10-12**); and

reactivating the device from the stand-by status when the recognition signal is produced (**10-12-16**).

28. A device, comprising:

an acceleration circuit configured to produce a dynamic acceleration signal corresponding to a level of acceleration in each of a plurality of detection axes (Figs. 3, 11, 12, 14, 15);

a comparator circuit for each of the detection axes, configured to compare the respective dynamic acceleration signal with respective higher and lower threshold signals (Figs. 3, 21, 22, 23, 24); and

a logic circuit configured to produce a first recognition signal at an output terminal if the dynamic acceleration signal of only a first one of the plurality of detection axes exceeds its respective higher threshold, if the dynamic acceleration signal of only a second one of the plurality of detection axes exceeds its respective higher threshold, and if the dynamic acceleration signals of any two of the plurality of detection axes exceed their respective lower thresholds (Figs. 3, 27); and

wherein the comparator circuit for each of the detection axes is configured to compare an absolute value of the respective dynamic acceleration signal with the respective higher and lower threshold signal (**7:25-8:10**).

29. A method, comprising:

sensing acceleration of a device in each of a plurality of axes (**5:4-15**);

comparing respective levels of the acceleration in the axes with a high threshold (**7:25-28**; **8:5-8**);

comparing the respective levels of the acceleration in the axes with a low threshold;

producing a first recognition signal if the level of the acceleration with respect to only a first one of the plurality of axes exceeds the high threshold (**8:14-17**);

producing the first recognition signal if the level of the acceleration with respect to only a second one of the plurality of axes exceeds the high threshold (**8:14, 15, 18, 19**);

producing the first recognition signal if the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold (**8:14, 15, 20-24**); and

wherein:

the step of producing the first recognition signal if the level of the acceleration with respect to any of the plurality of axes exceeds the high threshold comprises producing the first recognition signal if an absolute value of the level of the acceleration with respect to any one of the plurality of axes exceeds the high threshold (**8:14-19**); and

the step of producing the first recognition signal if the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold comprises producing the first recognition signal if an absolute value of the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold (**8:14, 15, 20-24**).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether claims 1-5, 10-12, and 28-31 are unpatentable under 35 U.S.C. § 103(a) over Woehrl et al. (U.S. 5,173,614, hereafter *Woehrl*), in view of Applicants' admitted prior art (hereafter, *APA*).

2. Whether claims 6-8 and 16 are unpatentable under 35 U.S.C. §103(a) over Woehrl, in view of APA and Oguchi (U.S. Pub. 2002/0033047).

3. Whether claim 9 is unpatentable under 35 U.S.C. §103(a) over Woehrl, in view of APA and Shimizu (U.S. Pub. 2003/0092493).

4. Whether claims 13-15, 17, 18, and 21-24 are unpatentable under 35 U.S.C. §103(a) over Woehrl, in view of Shimizu.

Whether claims 19 and 20 are unpatentable under 35 U.S.C. §103(a) over Woehrl, in view of Shimizu and Ishiyama (U.S. Patent 6,738,214).

VII. ARGUMENT

As discussed in detail above, the preferred embodiment of the invention is directed to a device and method for use with a portable electronic apparatus, to bring the apparatus out of a standby condition into full operation when the device is moved. Over the

course of the prosecution of the application, the Examiner has cited four primary references[4] and three secondary references,[5] plus the admitted prior art, to support rejection of the claims. Of the seven references relied upon at various times, only Shimizu makes any reference to methods or systems for providing reactivation signals for activating a device from standby, or to portable electronic devices that include such devices or circuits. As far as Appellants can determine, none of the remaining six references make even a minor reference or allusion to reactivating a portable electronic device from standby. All of the primary references relied upon are directed to systems or circuits for triggering airbags in vehicles. The other secondary references are directed to MEMS sensors (Oguchi), and computer hard drives (Ishiyama).

The Examiner cites Woehrl as the primary reference in all of the claim rejections. Woehrl is directed to a mechanism that provides a trigger signal for deployment of a vehicle's airbags. Woehrl's circuit includes a complex array of sensors, filters, switches, logic, etc., so as to distinguish the specific and narrow range of impacts that justify deployment of airbags from all of the other usual and unusual bumps and jolts that a typical vehicle undergoes. In order to adequately evaluate the appropriateness of the rejections, a thorough understanding of specific portions of Woehrl's system is necessary. Accordingly, prior to addressing the specific rejections, Woehrl will be discussed at some length in order to place its teachings in context with respect to the claimed inventions.

A. Discussion of prior art references.

Provided hereafter are brief discussions of the references relied upon by the Examiner in rejecting the claims under 35 U.S.C. §103.[6] Regarding the admitted prior art described in the background of the specification, this art has been discussed in detail above prior to the summary of claimed subject matter, at V, B, and will not, therefore, be described further here.

[4] Woehrl, et al. (U.S. 5,173,614), Blank, et al. (U.S. 6,274,948), Jeenicke, et al. (U.S. 5,788,273), and Kiribayashi, et al. (5,995,892).

[5] Shimizu (U.S. Pub. 2003/0092493), Oguchi (U.S. Pub. 2002/0033047) and Ishiyama (U.S. Patent 6,738,214).

[6] In the discussions and arguments that follow, when a specific passage of a U.S. patent is cited, it will be indicated by a column number separated from a line number by a colon.

1. <u>U.S. Patent No. 5,173,614 to Woehrl</u>

Woehrl is directed to an apparatus for triggering safety devices in vehicles, such as airbag devices,[7] and in particular, to an apparatus that can distinguish between different types of impacts including frontal impacts, lateral impacts, angular impacts, and rear impacts, as well as relatively small impacts,"[8] and provide a "trigger signal generating circuit which triggers or activates the safety device [of a vehicle] when it is assured that a frontal impact has occurred[, such that] rear impacts do not cause the deployment of an air safety bag, for example."[9]

Figure 4, below, shows portions of Woehrl's Figures 2A and 2B, in which Woehrl's disclosed triggering circuit is shown, diagrammatically. To simplify the discussion related to the Woehrl reference, Figures 2A and 2B have been merged into a single drawing that includes elements relied upon by the Examiner in rejecting most of the claims. In particular, all of the elements in the signal paths that provide the inputs of the OR-gate 44 are shown, as well as the portion of the logic circuit to which the output signal of the OR-gate 44 contributes. Extraneous elements have been omitted, and the resulting drawing has been shortened by shortening connecting lines between many of the elements. While much of the original drawing has been omitted, the elements that remain are arranged and connected exactly as shown and described by Woehrl.

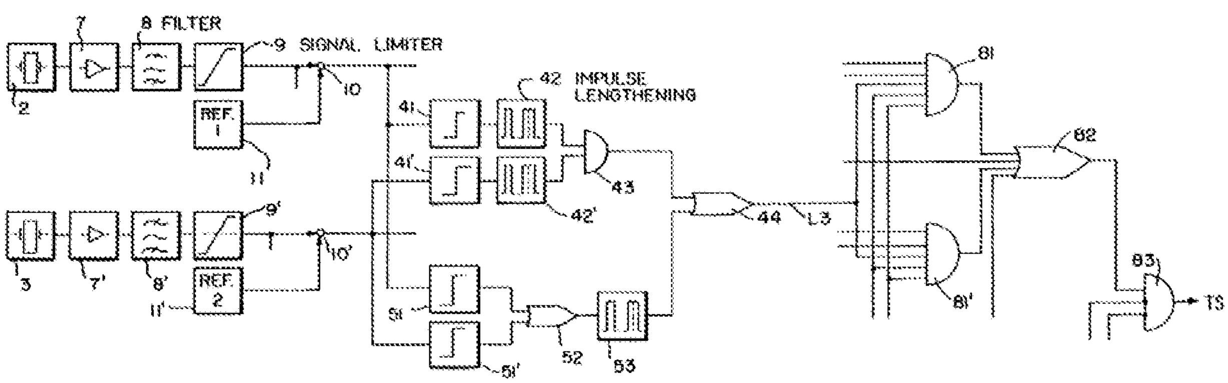

Figure 4
(from Woehrl's Figures 2A and 2B)

---

[7] See, e.g., *Woehrl*, abstract and 1:7-10.

[8] *Id.*, 1:54-57

[9] *Id.*, 2:20-25.

The portion of the circuit shown in Figure 4 includes directional impact sensors 2, 3 that are mounted in a vehicle, with their respective sensing axes orthogonal to each other and at a 45 degree angle with respect to the longitudinal axis of the vehicle.[10] Acceleration signals from the sensors 2, 3 are amplified and filtered via respective amplifiers 7, 7' and filters 8, 8'. Signal limiters 9, 9' limit the positive and negative amplitudes of the acceleration signals to selected values (*id*., 5:9-15). Reference signals are generated by reference signal circuits 11, 11' and deducted from acceleration signals of the respective sensors by difference forming circuits 10, 10' (*id*., 5:15-20). The signals, as modified by the difference forming circuits 10, 10' are supplied to threshold switches 41, 41', 51, 51', where they are compared to respective lower threshold values Sa4 at switches 41, 41' and respective higher threshold values Sa5 at switches 51, 51' (*id*., 7:24-27, 9:28-32).

It should be noted that by deducting the reference signals from the acceleration signals at difference forming circuits 10, 10', only relatively strong positive acceleration signals will be presented to the threshold switches; weaker signals and negative signals are thus eliminated from consideration. Negative-value signals are evaluated via a different portion of the circuit, which will be discussed later.

Outputs of the threshold switches 41, 41' are coupled to inputs of an AND gate 43, while outputs of the threshold switches 51, 51' are coupled to inputs of an OR gate 52 (for the purposes of this discussion, the impulse lengthening circuits 42, 42', and 53 can be ignored), and outputs of the AND gate 43 and OR gate 52 are coupled to respective inputs of the OR gate 44 (*id*., 7:30-40).

Each of the threshold switches 41, 41', 51, 51' is configured to produce a signal when its threshold value is exceeded by the respective acceleration signal. Accordingly, if either of the two acceleration signals exceeds the high threshold values Sa5 of the threshold switches 51, 51', the OR gate 52 will produce a high signal at its output, which, in turn will produce a high signal at the output of the OR gate 44. If both acceleration signals exceed the low threshold values Sa4 of the threshold switches 41, 41', the AND gate 43 will produce a high signal at its

[10] *Id*., 4:52-62 and Figure 1.

input of the OR gate 44, which, again, will produce a high signal at the output of the OR gate 44 (*id*., 9:26-32).

The output of the OR gate 44 is coupled to an input of each of two five-input AND gates 81, 81'. Outputs of the AND gates 81, 81' are coupled to inputs of an OR gate 82, the output of which is coupled to an AND gate 83 (*id*., 8:44-59). The output of the AND gate 83, which constitutes the output of the trigger circuit, produces a trigger signal TS, which, when produced, activates vehicle airbags or the like.

In addition to the signal paths described above, the acceleration signals are processed through many additional signal paths, where different characteristics are detected, and the results incorporated in the logic network, part of which is shown at the right side of Figure 4, to determine whether a trigger signal should be produced.

It can be seen that a high signal from the OR gate 44 cannot, itself, provoke a trigger signal. Only in combination with the appropriate signals at the other inputs of the AND gates 81, 81', and 83 can a trigger signal be produced. Nor is a high output signal from OR gate 44 essential to produce a trigger signal at the output of the trigger circuit, inasmuch as the OR gate 44 only contributes to two of the four inputs of OR gate 82. A signal at any one of the four inputs is sufficient, in combination with the appropriate signals at the other inputs of AND gate 83, to produce a trigger signal TS (*id*., 10:10-15).

To assist in the discussion of Woehrl's treatment of negative signals, Figure 5 is provided, again derived from Woehrl's Figures 2A and 2B. As with Figure 4, the signal paths that are of interest are shown in their entirety, coupled exactly as shown and described by Woehrl, while most of the extraneous elements are omitted for clarity. The OR gate 44 and conductor L3 are included so that the circuit of Figure 5 can more easily be considered as it relates to the circuit of Figure 4. The resulting drawing is again modified to the extent that connecting lines are shortened or lengthened to produce a diagram that is more compact and legible.

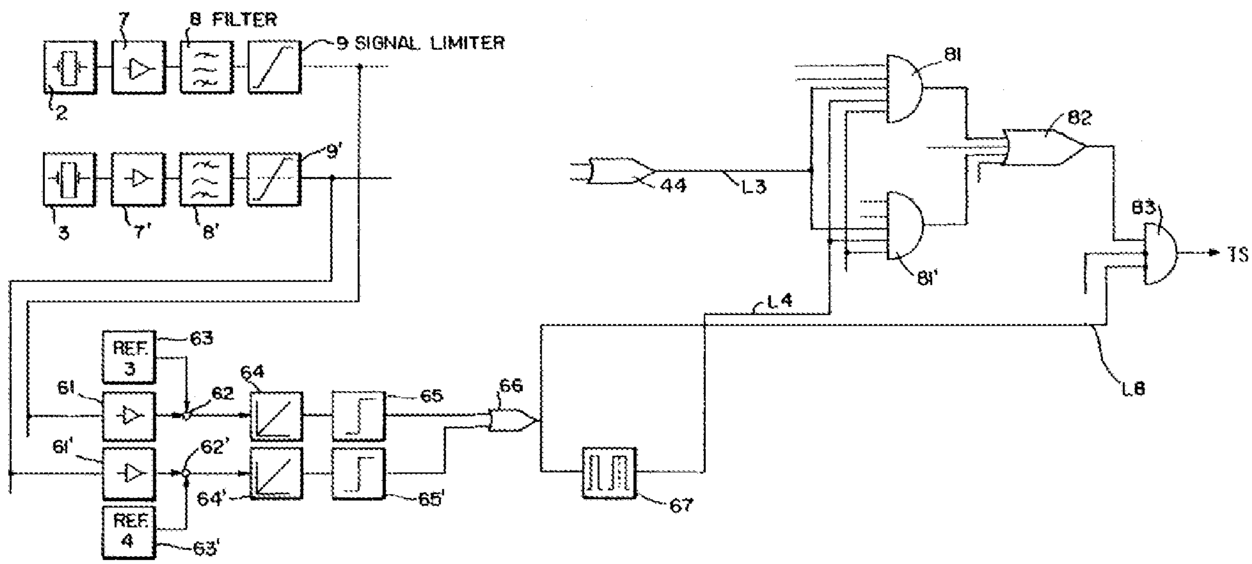

Figure 5
(from Woehrl's Figures 2A and 2B)

Referring now to Figure 5, a rear impact recognition circuit is shown, in which the acceleration signals from sensors 2, 3 are provided at inputs of inverting amplifiers 61, 61', which reverse the polarity of the respective signals so that the negative portions of the signals, *i.e.*, the signals produced by rear-impact accelerations, can be processed as positive-value signals. Reference signals from reference signal circuits 63, 63' are deducted from the inverted signals at summing (difference forming) circuits 62, 62' just as described above with reference to Figure 4 (*id.*, 7:52-66). The resulting acceleration signals are provided at the inputs of respective integrating circuits 64, 64' and then to respective threshold switches 65, 65' (*id.*, 8:1-8).

The outputs of the threshold switches 65, 65' are coupled to respective inputs of an OR gate 66, whose output is coupled to inputs of the AND gates 81, 81', and 83 (*id.*, 8:8-18). It is important to note that the signal from the OR gate 66 is inverted at the inputs of each of the AND gates (*id.*, 8:57-59, 9:35-44). Thus, when a negative acceleration is detected by one of the threshold switches 65, 65', a low signal is produced on the conductors L4 and L8 and at the inputs of AND gates 81, 81', and 83. Because an AND gate will produce a high signal at its output only when all of its input signals are high, a low signal from the OR gate 66 *effectively blocks the production of a trigger signal TS* (*id.*, 9:41-46). It can be seen that a trigger signal is produced in response to particular positive-value accelerations, but cannot be produced in response to negative-value accelerations, regardless of strength or duration.

Finally, Woehrl's combined Figures 2A and 2B are presented below in their entirety as Figure 6. Arrows A and B are added.

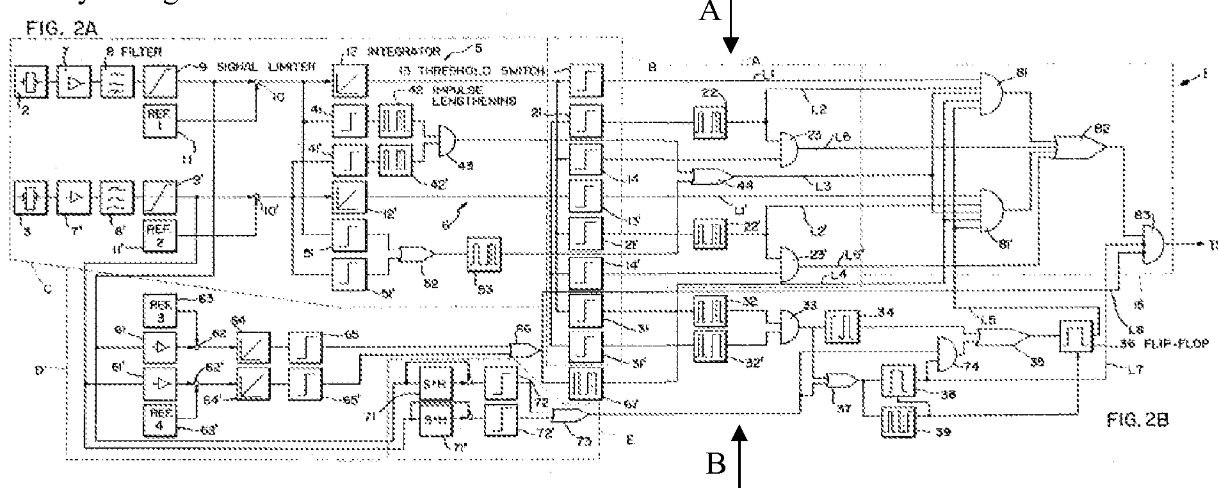

Figure 6
(Woehrl's combined Figures 2A and 2B)

Figure 6 is not provided for a discussion of particular elements, but of the overall structure of the device. Impact signals are initiated at the impact sensors 2, 3, at the far left, and move to the right as they pass through the various components of the circuit. The elements at the left of Figure 6 include filters, comparators, integrators, amplifiers, etc., and are largely provided for signal conditioning, until the analog representation of an impact, that begins at the left, is transformed to a plurality of digital high or low values at respective conductors. The elements at the right are, for the most part, logic devices that receive and process the various digital signals to determine whether a trigger signal should be produced at the output terminal TS.

There are a couple of points that should be noted: first, all of the various signals are derived from the outputs of the two impact sensors 2, 3, each signal path representing a different characteristic of the impact signal from one or both of the sensors, e.g., direction of a signal-producing impact, its magnitude, and its duration; and second, looking at the signal paths that pass between the arrows A and B, it can be seen that the output signal of the OR gate 44, at conductor L3, is one of twelve signal paths, at that stage, that feed into the logic network in which the determination to produce a trigger signal is made.

Other components of Woehrl's system will not be reviewed in detail. It is sufficient to note that each of the separate inputs to AND gates 81, 81', and 83 is provided to supply a signal that enables or blocks production of a trigger signal TS under specific conditions.

It is the collective operation of all these gates and signals that enables Woehrl to "distinguish a frontal impact from a lateral impact and from a rear impact as well as from other short duration minor impacts such as a hammer blow in a repair shop," and to trigger deployment of, e.g., a vehicle airbag only when the direction, magnitude, and duration of an impact meet selected criteria.[11]

2. U.S. Pub. 2002/0033047 by Oguchi

Oguchi is directed to a micro-electro-mechanical sensor, and in particular to the structure of such a sensor, which is resistant to locking up and becoming inoperable when subjected to an excessive impact (*Oguchi*, abstract).

3. U.S. Pub. 2003/0092493 by Shimizu

Shimizu is directed to a game system in which two or more game machines are connected for game play, e.g., a portable game machine and a non-portable game machine. If one of the machines shifts to a sleep mode as a result of some period of inactivity, the controller detects the sleep mode and sends a notice to the other machine.

Shimizu provides several examples of sleep mode systems, including a system that employs an acceleration sensor, in which the system is released from sleep mode by shaking the portable machine.[12]

4. U.S. Patent No. 6,738,214, to Ishiyama

Ishiyama is directed to a computer disk drive that includes a mechanism for detecting "static acceleration" that indicates that the device has been dropped, and for retracting the read/write head of the disk drive before the "dynamic acceleration" that occurs when the device strikes a surface in a fall.

B. Case Law of General Relevance

"[Under 35 U.S.C. §103,] a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions." *KSR Intern. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740, 82 U.S.P.Q.2d 1385 (2007). The Examiner initially

[11] *See*, e.g., *id*., at 2:7-43.

[12] *Shimizu*, paragraph 58.

bears the burden of establishing a *prima facie* case of obviousness. *In re Bell*, 26 U.S.P.Q.2d 1529 (Fed. Cir. 1993); *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (1984); MPEP § 2142. An Applicant may attack an obviousness rejection by showing that the Examiner has failed to properly establish a *prima facie* case or by presenting evidence tending to support a conclusion of non-obviousness. *In re Fritch*, 972 F.2d 1260, 1265, 23 U.S.P.Q.2d 1780 (1992). "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 USPQ 303 (1983). "If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." MPEP § 2143.01, citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (1984). "A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." MPEP § 2141.02, citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (1983). "If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." MPEP § 2143.01, citing *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

C. <u>General responses to the Examiner's arguments.</u>

There are a number of arguments that the Examiner submits that are broadly applicable to many of the claims and rejections.

1. <u>Portable electronic apparatus</u>

With regard to the meaning of the term *portable electronic apparatus*, the Examiner argues:

> The Woehrl vehicle is portable and the circuitry to [*sic*] triggering the air bag is electrical. Therefore, the reference (although directed towards a different art)

> meets the intended use limitation of "for use with a portable electronic apparatus.[13]

Appellants believe that this is an incorrect interpretation. The term *portable* is generally applied as a modifier to distinguish one element from otherwise similar elements, and can be broadly interpreted as meaning *more movable*. For example, *portable telephone* is a term often applied to a cordless telephone to distinguish it from telephones that are hard-wired, and therefore cannot be moved beyond a radius defined by the length of the telephone cord. Of course, it is well understood that, apart from the effort required to unplug it, many standard telephones can be moved as easily as a portable telephone. Nevertheless, the portable telephone is more movable because it can be moved within a much wider area during use. One would certainly not use the same standards to define a *portable table saw* or a *portable space heater*. In each case, one must look to the element being defined, and ask what is typical for that class of elements. The newly cited Shimizu reference defines *portable*, as it applies to a game machine:

> Game machines can be broadly divided into the categories of non-portable game machines and portable (handheld) game machines. A non-portable game machine, which is generally called a TV game machine, performs game processing …, and displays a resulting game screen on a home television receiver or the like[14]

The Examiner has argued that a vehicle airbag controller is portable because it is attached to a vehicle, which itself is "portable." Appellants disagree. As compared to other electronic devices, the airbag controller is much *less* movable, because it is fixed to the vehicle, is inaccessible to the ordinary vehicle owner, and cannot itself be moved without also moving the vehicle. In defining *portable electronic apparatus*, Appellants suggest that Shimizu's definition is far more apposite. A game machine is a very common electronic apparatus, and the definition offered – *handheld* – would be widely recognized as a primary characteristic that differentiates *portable* from *non-portable*, as applied to many other classes of electronic apparatus, such as, e.g., radios, music players, computers, GPS devices, etc.

---

[13] *Office Action*, page 3.

[14] *Shimizu*, paragraph 2.

2. Character of the signal at L3

The Examiner argues that "Woehrl discloses that the L3 signal is sufficient, by itself, to trigger the airbags."[15] Appellants disagree. The Examiner points to Woehrl's column 8, line 60 through column 9, line 1. The entire passage cited is quoted below:

> The circuit arrangement according to the invention operates as follows: Let it be assumed that the acceleration sensor 2 provides a non-symmetrical signal having a distinct polarity to determine a direction of impact, and which exceeds the first reference value Sa3 from 11 providing said reference value. The resulting signal at 10 will be integrated in the integrating circuit 12. If now the integrated signal exceeds the threshold Sv2 at 13 (or 13'), then the output of the AND-gate 81 will provide a "high"-signal.

Appellants can find no reference in this passage to the conductor L3, let alone that its signal can trigger the airbag "by itself." It can be seen, with reference to Figure 6 of the present brief, that the components 12, 13, and 13' do not even contribute to the signal at L3. Additionally, the high signal referred to at gate 81 is, itself, only another internal signal.

If it was the Examiner's intent to argue that the signal at L3 is the essential positive qualifying signal, providing the primary trigger signal, and that all of the remaining circuitry and logic is provided merely to prevent a trigger signal that is qualified by L3, but that would be inappropriate for other reasons, Appellants again disagree. The passage quoted above clearly shows two other qualifying paths (13, 13') that are unrelated to L3, that provide output signals to the same two AND gates as L3, and that are certainly no less important to Woehrl's operation than L3.

Appellants note that the trigger signal TS is a digital value produced by logic gate 83, and that all of Woehrl's logic gates likely operate at similar digital levels. It is likely, therefore, that if the output terminal TS were connected directly to L3, the logic signal from gate 44 would be physically capable of producing a signal sufficient to trigger the airbags. However, the same can be said for every one of the logic gates, so this does nothing to distinguish L3 as being of particular interest. Woehrl did not provide a direct connection from L3 to the output terminal, so it cannot, by itself, under any circumstances, trigger the airbags.

[15] Office Action, pages 4, 13,

D. Rejection of claims 1-5, 10-12, and 28-31 under 35 U.S.C. §103(a) over Woehrl, in view of APA.

1. Claims 1-5

Claim 1 recites, in part,

> A multidirectional inertial device …, comprising: … first comparison means, … supplying a first recognition signal when only a first of said acceleration signals is greater than a respective upper threshold …; and second comparison means … for supplying said first recognition signal when any two of said acceleration signals are each greater than a respective lower threshold, which is smaller than the respective upper threshold; and wherein the first comparison means supply the first recognition signal when an absolute value of a first one of said acceleration signals is greater than the respective upper threshold, and when an absolute value of a second one of said acceleration signals is greater than the respective upper threshold, and the second comparison means supply the first recognition signal when the absolute value of any two of said acceleration signals are each greater than the respective lower thresholds.

Woehrl in combination with the APA are not sufficient to show *prima facie* obviousness of claim 1. In particular, Woehrl fails to teach or suggest supplying a first recognition signal when an absolute value of the recited acceleration signals is greater than the recited thresholds, as set forth in the claim, and Woehrl cannot be combined with the APA to correct its deficiency.

Woehrl is directed to triggering an airbag circuit, and is specifically configured to differentiate among a wide range of impacts, and differentiate according to direction, magnitude, and duration, in order to prevent triggering the airbags in response to a rear-impact collision, for example.[16] Woehrl cannot supply recognition signals in response to the absolute value of acceleration while also differentiating between positive and negative acceleration.

The Examiner points to Woehrl's signal paths extending from the impact sensors 2, 3, through threshold switches 41, 41', 51, and 51', and terminating at the conductor L3 at the output of the OR gate 44, as corresponding to the sensor means, transduction means, and first and second comparison means of claim 1, and points to the signal produced at the output of Woehrl's OR gate 44 as corresponding to the recognition signal supplied by the first and second comparison means of claim 1.[17] The Examiner acknowledges that Woehrl does not teach or

---

[16] *Woehrl* 2:16-25.

[17] *Office Action*, pages 10 and 11.

suggest using the absolute values of the acceleration signals, but relies on the ADA to provide this teaching.[18] This is a clear error. Woehrl cannot be combined with any reference that teaches producing a recognition signal in response to an *absolute value* of an acceleration signal, for several reasons. First, the proposed combination would render Woehrl unsatisfactory for its intended purpose, and would change its principle of operation.[19] The Examiner argues that:

> Based on the combination with APA, one skilled in the art would be motivated to either:1) duplicate the Woehrl circuitry for also comparing negative signals against the same thresholds (in this case, OR gate 44 would have 4 inputs); or 2) not remove the negative component of acceleration in the first place. By keeping the negative acceleration, the magnitude of acceleration (in either direction) determines L3.[20]

The Examiner's proposed modification would result in a single signal output at L3 responding equally to front or rear impacts. However, as previously explained, Woehrl deliberately separates and processes positive acceleration signals differently from negative signals. The negative signals are applied in the circuit to <u>block activation</u> of a trigger signal, to expressly prevent a negative acceleration from producing a trigger signal.[21] As Woehrl states, "[t]he rear impact recognition circuit D <u>is intended to prevent the activation</u> of the safety device in response to a rear impact."[22] If Woehrl were modified as proposed by the Examiner, its ability to distinguish and react differently to front and rear impacts would be eliminated. Woehrl's explicitly stated intent would be frustrated.

Furthermore, even if the conductor L3 at the output of the OR gate 44 could be modified as proposed without defeating the operation of that part of the circuit, the Examiner's overall modification would still render Woehrl unsatisfactory for its intended purpose, as explained below. The Examiner's position is that one of ordinary skill in the art would look at the output of Woehrl's OR gate 44 as producing a recognition signal, and that such a person

---

[18] *Id.*, at page 11.

[19] See MPEP § 2143.01 (if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.), and (if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.).

[20] *Office Action*, page 5.

[21] *See Woehrl* 9:41-47.

[22] *Id.,* 7:52-54, emphasis added.

would be motivated, in view of the APA, to modify Woehrl's circuit in a way that would meet the limitations of claim 1, including the production of a recognition signal at L3.[23] The Examiner argues that "the claims do not recite that this signal completes any function," and therefore, "[t]he Woehrl L3 signal meets the claimed limitations regarding how the signal is created. It does not matter that Woehrl describes additional logic gates (fig 2b), because the claims do not recite a use for the recognition/reactivation signal."[24]

The Examiner has confused the standards for anticipation, under section 102, and obviousness, under section 103. If a single reference properly anticipates every element of a claim, the claim is invalid under 35 U.S.C. § 102.[25] Considerations such as whether the art is analogous, or teaches away, or is intended for a different purpose, etc., are all irrelevant.[26] Likewise, if Woehrl anticipated all of the limitations of claim 1, such considerations would also be irrelevant here. However, where all of the elements are not anticipated by a single reference, all such considerations are relevant. And, contrary to the Examiner's statement, it is not required that a claim recite the intended purpose of a claimed structure, and the absence of an intended function or purpose set forth in the claim does not relieve the Examiner of the requirement to consider all of the teachings of a prior art reference, including its intended purpose, and *including portions that would lead away from the claimed invention*.[27]

In the present case, by pointing to the output of OR gate 44 at L3 as providing the recognition signal of claim 1, the Examiner is holding that a person having ordinary skill in the art would not only make the modifications outlined, in order to meet the "absolute value" limitation of claim 1, but that the person would also discard all of the elements of Woehrl's circuit that are not necessary or that conflict with the limitations of claim 1. In other words, with reference to Figures 4 and 6 of the present brief, the person would somehow be motivated to discard all of the elements shown in Figure 6 except those elements shown in Figure 4 that are to the left of L3. Furthermore, the person would, at the same time, significantly modify the remaining structure so as to be capable

---

[23] *Office Action*, pages 10 and 11.

[24] *Id.*, page 4.

[25] *See*, MPEP § 2131.

[26] *See*, e.g., MPEP § 2131.05.

[27] *See*, e.g., MPEP § 2141.02.

of responding to negative-polarity impact signals. Such a modification would certainly not be suitable for Woehrl's intended purpose. It also begs the question of what would motivate the person of ordinary skill, *absent the language of claim 1 as a template*, to make such radical modifications to an airbag trigger circuit, merely on the basis of an understanding that the wake-up circuits of some portable electronic devices are responsive to positive and negative acceleration.

As noted, the Examiner has argued that "[i]t does not matter that Woehrl describes additional logic gates [to the right of L3], because the claims do not recite a use for the recognition/reactivation signal." This is incorrect. Under section 103, the Examiner must look to the intentions expressed in the prior art, particularly the intended use, rather than in the claim. Woehrl has clear and explicit intentions, with respect to the "additional logic gates," which do not meet the limitations of claim 1, but instead teach away from the claim limitations. For example, Woehrl provides the circuit discussed above with reference to Figure 5 for the express purpose of preventing a trigger signal from being produced in response to a negative acceleration value.[28] The Examiner argues that,

> Since Woehrl uses the acceleration sensors to trip an airbag, negative acceleration signals are used to verify the angle of collision and prevent airbag deployment (via 81, 81'; see col. 9). Combining Woehrl with another electronic device would remove the need to prevent providing the recognition signal in the event of a rear impact.[29]

It appears that the Examiner understands that if a prior art reference is modified for use in a way entirely unforeseen or unintended by the prior art, any provisions in the reference that would conflict with the new use can be simply ignored or discarded. Appellants strongly disagree. The Examiner has failed to consider the teachings of Woehrl, as a whole, but has selected the portions that would tend to meet the claim limitations, and dismissed those that would conflict.[30]

[28] *Woehrl* 9:41-47.

[29] *Office Action*, page 12.

[30] *See* MPEP § 2141.02 (A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention.).

Finally, Appellants do not believe that the Examiner has adequately demonstrated that one of ordinary skill would be motivated to combine the APA with Woehrl. The Examiner argues that:

> Woehrl does not expressly disclose using absolute values of the acceleration signals. … Woehrl discloses that low and negative acceleration values are filtered (9) and/or removed (10). APA discloses that it is known to use a multidirectional inertial device to supply a recognition signal when the components of force according to a sensor direction exceeds a predetermined threshold.[31]
>
> And:
>
> At the time of the invention by applicants, it would have been obvious to combine the threshold levels disclosed in Woehrl with the components of force disclosed in APA. The motivation for doing so would be to detect angled impacts in both sensor directions."[32]

The Examiner argues that the APA provides the necessary teaching that an inertial sensor device can be used to supply a signal when an acceleration exceeds a threshold in multiple directions, and that the person of ordinary skill would be motivated to make the proposed modification in order to detect impacts in both directions. The Examiner is in error on both points. First, it is abundantly clear from Woehrl's disclosure that Woehrl is perfectly aware that inertial sensors can be used to detect motion in both directions, and that a signal can be produced in response. As described in detail in the review of the Woehrl reference, above, Woehrl's circuit is designed to *prevent* negative signal values from reaching L3. If Woehrl was *not* aware of the possibility, there would have been no reason to so carefully design a circuit to prevent it. Woehrl even goes as far as creating a separate circuit designed to detect the negative signals so as to prevent a false positive arising from a negative signal. If the person of ordinary skill is assumed to have a complete understanding of Woehrl's system, then the APA teaches nothing new.

As to the motivation, the Examiner argues that it would be "to detect angled impacts in both sensor directions." This, too, is also clearly known and understood by Woehrl. Woehrl's circuit is already configured to detect impacts in both sensor directions. However, in Woehr's case, the signals are separately detected, enabling Woehrl to distinguish front impacts

---

[31] *Office Action*, page 11.

[32] *Id.*, page 12.

from rear, and to employ the respective signals in contrasting ways. The fact that Woehrl has explicitly chosen to eliminate negative impact signals as potential triggering events is not an indication that Woehrl was ignorant of the alternate possibility, but instead demonstrates an express, knowing rejection of the Examiner's proposed modification.

As demonstrated above, Woehrl teaches away from the limitations of claim 1. A combination of Woehrl with the APA is improper and does not support a case of *prima facie* obviousness because it would render Woehrl unsatisfactory for its intended purpose; it would change Woehrl's principle of operation, and because Woehrl teaches away from a combination with the APA. For at least these reasons, claim 1 is allowable over Woehrl, together with dependent claims 2-5.

2. Claim 31

Claim 31, which depends from claim 1, recites, "an output terminal of the multidirectional inertial device, and wherein the first and second comparison means are each configured to supply the first recognition signal at the output terminal." Woerhl fails to teach or suggest this limitation, at least because the trigger signal produced at its output terminal is specifically tailored to be in response to forward impact signals only, and so cannot be in response to comparisons of absolute-value signals, as required by the combination of claims 1 and 31. The APA is silent regarding circuit structure, and so cannot remedy the deficiency of Woehrl. The rejection of claim 31 is therefore in error.

In rejecting claim 31, the Examiner argues that

> it would be obvious to label the output of logic gate (44) [as] the output of the inertial device.… Woehrl disclose that the L3 signal is capable, by itself, of triggering the airbag. But because of the possibility of rear impacts or minor bumps, it would be beneficial to add logic gates to prevent L3 from triggering the air bag unless only a front impact is sensed (col. 9). Therefore, Woehrl provides the motivation for labeling the output of OR gate 44 as the output of the device."[33]

As best understood, the Examiner's argument is that it would be obvious for one of ordinary skill in the art to label L3 as the output (for reasons that are not clearly explained) and that Woehrl might have used L3 as its output, except that, because the circuit would be used to trigger airbags, it would be preferable to add additional logic to prevent this possibility, which

[33] *Office Action*, pages 13, 14.

therefore requires a different output terminal. Thus, if the circuit is <u>not</u> used to trigger airbags, it would be obvious to simply ignore the elements provided only for that purpose, and use L3 as the output. To the extent that the Examiner's reasoning has been correctly understood, Appellants strongly disagree. Woehrl provides no disclosure even remotely suggesting the Examiner's line of reasoning. There is absolutely no reference indicating that the signal at L3 is capable of triggering the airbag, or that "because of the possibility of rear impacts or minor bumps, it would be beneficial to add logic gates." The Examiner's argument appears to suggest that everything extraneous to the signal at L3 was secondary, and of less importance or value to Woehrl. Appellants can find no passage in Woehrl that describes the evolution of the circuit design, or the original motivation for its inception, nor whether L3 was contemplated as a possible output. There is also no discussion of the use of the circuit or portions thereof for purposes other than those described. On the other hand, Woehrl explicitly describes, as an object of the invention:

> to construct an impact sensor … in such a way that it can reliably distinguish between different types of impacts including frontal impacts, lateral impacts, angular impacts, and rear impacts, as well as relatively small impacts, such as a hammer blow in a repair shop ….[34]

Appellants assert that it is improper to infer an understanding on the part of a designer that is not found in the language of the disclosure. Taking Woehrl's disclosure "in its entirety," Woehrl clearly points to its terminal TS as the output terminal of its device, notwithstanding the Examiner's arguments. Use of L3 as an output terminal would prevent Woehrl's circuit from performing correctly, and would render it unsuitable for its intended purpose. This is tacitly acknowledged by the Examiner in stating that the additional logic gates are beneficial to prevent L3 from triggering the air bag incorrectly – if the additional logic gates were absent, the possibility of an unnecessary trigger would be greatly increased, or perhaps guaranteed, so the circuit would fail in its explicitly stated intended purpose, as quoted above. Using L3 as the output terminal would render those logic gates useless. Woehrl therefore teaches away from such a use.

The recent Supreme Court case *KSR Intern. Co. v. Teleflex Inc.*[35] provides some guidance that is relevant to the present question, stating that " a court [or Examiner] must ask

[34] *Woehrl*, 1:50-59.

[35] 127 S.Ct. 1727, 1740, 82 U.S.P.Q.2d 1385 (2007).

whether the improvement is more than the predictable use of prior art elements according to their established functions."[36] The predictable use of Woehlr's circuit is as a trigger circuit in a motor vehicle safety system. Woehlr's established function is to "construct an impact sensor … in such a way that it can reliably distinguish between different types of impacts including frontal impacts, lateral impacts, angular impacts, and rear impacts, as well as relatively small impacts,"[37] and provide a "trigger signal generating circuit which triggers or activates the safety device [of a vehicle]when it is assured that a frontal impact has occurred[, such that] rear impacts do not cause the deployment of an air safety bag, for example."[38] The predictable-use of Woehrl's circuit is in a vehicle performing the specific and narrow function set forth. Any other predictable use would be very closely related.

One of ordinary skill would certainly not predict the use of Woehrl's circuit to function, in many ways, practically opposite the explicitly outlined functions. The Examiner's proposed modification clearly fails to meet either the established function prong or the predictable use prong of the test set forth by the KSR court. A device modified as proposed by the Examiner would not operate according to Woehrl's established function, and if it were used in the proposed form for something other than triggering vehicle airbags, it would not be a predictable use. The proposed modification would also change Woehlr's principal of operation, and would render Woehrl unsatisfactory for its intended purpose.[39] For all the reasons set forth above, claim 31 is not *prima facie* obvious, and is allowable over Woehrl, in combination with the APA.

3. Claims 10-12

Claim 10 recites, in part, "generating a plurality of acceleration signals, each of which is correlated to an **absolute value** of an acceleration parallel to a respective preferential detection axis; supplying a first recognition signal at an output terminal when only a first one of said acceleration signals is greater than a respective upper threshold; supplying the first recognition signal at the output terminal when only a second one of said acceleration signals is

[36] *Id.*, at 1740 (emphasis added).

[37] *Woehlr*, 1:54-57.

[38] *Id.*, 2:20-25.

[39] See MPEP § 2143.01, quoted supra at foot note 19.

greater than a respective upper threshold; and supplying the first recognition signal at the output terminal when any two of said acceleration signals are each greater than a respective lower threshold ...."

Woehrl in combination with the APA fail to teach or suggest these limitations of claim 10. As is well known in the art, the term "absolute value" refers to a value that is considered without reference to its polarity. Thus, for example, the sum of the absolute values of negative 2 and 3 is equal to the sum of 2 and 3: $|-2| + |3| = 2 + 3$.

Woehrl specifically distinguishes between positive and negative acceleration signals so as to "prevent the activation of the safety device in response to a rear impact."[40] This is accomplished, in part, by deducting a reference value Sa3 from the output of the signal limiters 9 (at summing circuit 10) before further processing the signals and providing results at various logic gates, including gate 44.[41] Deducting a value from the signals ensures that only relatively strong forward impacts can exceed the values of the threshold switches 41 and 51. One of ordinary skill in the art will recognize that no negative value signals, such as would result from a rear impact, will be detected by this device, and that the output of the logic gate 44, as well as that of the triggering device, is controlled to respond only to positive value signals. For its part, the APA is silent with regard to specific structures, and does not refer to sensing an absolute value of an acceleration, but even if it did, such teachings would be in direct conflict with Woehrl's teachings regarding separating negative signals from positive signals. There is no objective motivation by which one of ordinary skill would choose to ignore the explicit teachings of Woehrl by combining the references. The Examiner does not address the conflict in teachings between Woehrl and APA, and provides no basis by which they can be resolved so as to support the combination. Instead, the Examiner appears to have ignored Woehrl's teachings that run contrary to the teachings of the APA or to the limitations of the claims. The rejection is therefore in error. Claims 10-12 are allowable over the proposed combination.

---

[40] *Woehrl*, 7:52-54.

[41] *Id.*, at 5:15-22 and 7:24-49, and Figures 2A, 2B.

4. Claim 28

Claim 28 recites "a logic circuit configured to produce a first recognition signal at an output terminal …[and that] the comparator circuit for each of the detection axes is configured to compare an absolute value of the respective dynamic acceleration signal with the respective higher and lower threshold signal." A combination of Woehrl and APA fail to teach or suggest these limitations. The rejection is therefore in error.

The scope of claim 28 differs from that of claims 1 and 31, but its allowability will be evident based on a review of the arguments put forth in support of the allowability of those claims.

5. Claims 29

As discussed in detail above with respect to similar limitations, Woehrl fails to teach or suggest "producing the first recognition signal if an absolute value of the level of the acceleration with respect to any one of the plurality of axes exceeds the high threshold; and … producing the first recognition signal if an absolute value of the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold," as recited in claim 29. The rejection of claim 29 is therefore in error.

See, for example, the discussion related to claim 1.

E. Rejection of claims 6-8 and 16 under 35 U.S.C. §103(a) over Woehrl, in view of APA and Oguchi.

Appellants believe that claims 6-8 and 16 are allowable as depending from an allowable base claim.

F. Rejection of claims 13-15, 17, 18, and 21-24 under 35 U.S.C. §103(a) over Woehrl, in view of Shimizu.

1. Claims 13, 14, and 18

Claim 13 recites, in part, "a portable electronic apparatus configured to go into stand-by after a period of inactivity and to return to an active state when a first recognition signal is produced at an output terminal, including: … a logic circuit configured to produce a first

recognition signal at the output terminal if the dynamic acceleration signal of only a first one of the plurality of detection axes exceeds its respective higher threshold, if the dynamic acceleration signal of only a second one of the plurality of detection axes exceeds its respective higher threshold, and if the dynamic acceleration signals of any two of the plurality of detection axes exceed their respective lower thresholds." A combination of Woehrl and Shimizu fails to teach or suggest all of the limitations of claim 13. In particular, neither reference teaches or suggests a logic circuit configured to produce the first recognition signal at the output if the dynamic acceleration signals of any two of the plurality of detection axes exceed their respective lower thresholds. The rejection of claim 13 is therefore in error.

In rejecting claim 13, the Examiner points to Woehrl's logic gates 43, 44, 52 as corresponding to the logic circuit of claim 13, and therefore evidently continues to hold that the recognition signal is produced at L3, and points to Shimizu's paragraphs 55-58 as teaching the output terminal. Appellants strongly disagree. First, the passage of Shimizu cited by the Examiner is entirely silent regarding an output terminal. Shimizu does indicate that its device can be awakened by shaking to activate an acceleration sensor. However, Shimizu does not include any schematic circuit diagrams or other illustrations that show an output terminal, and appellants find no mention of a terminal of any kind. Nevertheless, even if Shimizu could be regarded as inherently teaching an output terminal (which has not been demonstrated), there has been no sufficient showing that in the proposed combination, Woehrl would provide the recognition signals of claim 13 at the output terminal.

Woehrl is directed to a circuit configured to trigger a vehicle airbag by providing a trigger signal TS at its output terminal. Woehrl places no special importance on the signal at L3, except as one of many internal signals that are processed to produce the trigger signal. Assuming, *arguendo*, that one were motivated to combine Woehrl with Shimizu in order to provide a signal for Shimizu to exit sleep mode, one would use the signal TS provided by Woehrl. There is nothing in Shimizu or Woehrl that would suggest that the TS signal as provided would be unacceptable, or that would otherwise motivate one to take a signal from some internal part of the circuit. Shimizu teaches that the machine is activated "by shaking the portable game machine to wake up the sleeping character …."[42] It would merely require the

[42] *Shimizu*, paragraph 58.

selection of appropriate thresholds for Woehrl to provide the wake-up signal at its output upon being shaken. On the other hand, if Woehrl were modified to place the output at L3, this would change its operating principles, and the resulting device would be unsuitable for its intended purpose.

The Examiner has pointed to a portion of Woehrl's circuit where some elements of claim 13 are met, but the person of ordinary skill would not have access to claim 13 as a guide, and would therefore not be guided to the Examiner's proposed combination. Assuming, *arguendo*, that Woehrl's teachings to the contrary, or intended use, or principles of operation, are of no relevance, appellants note that the outputs of gates 52 and 66 both provide a signal when either acceleration sensor provides a signal above a threshold. Furthermore, either gate offers a simpler circuit than gate 44. Thus, even if it were appropriate to make wholesale changes to the prior art, a person of ordinary skill would be far more likely to select a different solution than that proposed by the Examiner.

For at least the reasons set forth above, claim 13 is allowable, together with dependent claims 14 and 18.

2. Claim 15

Woehrl fails to teach or suggest that "each of the transduction circuits is configured to subtract, from the respective acceleration value, a respective static acceleration value, thereby producing the respective dynamic acceleration signal," as recited in claim 15.

In rejecting claim 15, the Examiner states that:

> Woehrl discloses a summing junction (10) where a reference value ("static") of acceleration is combined with the filtered signal. At the time of the invention by applicant, it would have been obvious to one skilled in the art that subtracting a negative number is identical to adding a reference value, as taught by Woehrl.[43]

Appellants disagree. Claim 15 recites a *static acceleration value*, not a mere static value. Woehrl's reference value does not represent an acceleration, and one of ordinary skill would not consider it to be an acceleration value. The Examiner has not pointed to a *static acceleration signal*, and the rejection of claim 15 is therefore in error.

[43] Office Action, page 17.

The specification clearly explains that an acceleration signal from an inertial sensor often includes a *continuous component* that represents the constant acceleration of gravity. To provide a signal that accurately corresponds to the dynamic acceleration, that component must be separated from the signal. The process includes filtering the signal to produce a static signal that is equal to the continuous component, then subtracting that signal from the complete signal, leaving behind the dynamic acceleration signal.[44] One of ordinary skill would recognize that the *static acceleration value* of claim 15 refers to the *static acceleration signal* described in the specification.

3. Claim 17

Woehrl fails to teach or suggest "a transduction circuit configured to receive from the sensor an acceleration value corresponding to a level of acceleration in each of the plurality of detection axes, sequentially, and to produce, for each detection axis, its respective dynamic acceleration signal," as recited in claim 17. Woehrl instead employs a separate transduction network for each acceleration sensor. The Examiner argues that:

> it would have been obvious to combine the transduction circuits into one circuit (by removing one and passing both signals through the other one) that sequentially outputs the acceleration signals, since it has been held that forming in one piece an article which has formerly been in two pieces and put together involves only routine skill in the art.[45]

Appellants disagree. The Examiner has misconstrued the case law, and has not provided adequate teaching or motivation for the proposed modification of Woehrl. In *Howard*, the inventor (Beckwith) had filed a patent on a stove grate that was substantially identical to known grates except that, where known grates were typically made in two pieces that were then riveted together, Beckwith's grate was cast as a single piece. The court found that it was not inventive to form both pieces in a single casting. The present case is not analogous. Claim 17 recites, essentially, that one transduction circuit does the work of two. Beckworth did not eliminate one of the pieces of his grate; he only put them together.

---

[44] *Specification*, **5:28-6:15**.

[45] *Office Action*, page 17 (citing *Howard v. Detroit Stove Works,* 150 U.S. 164 (1893).

4. Claims 21 and 22

Claim 21 recites, in part, "producing a first recognition signal if the level of the acceleration with respect to only a first one of the plurality of axes exceeds the high threshold; producing the first recognition signal if the level of the acceleration with respect to only a second one of the plurality of axes exceeds the high threshold; producing the first recognition signal if the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold; deactivating a device to a stand-by status in response to a period of inactivity of the device; and reactivating the device from the stand-by status when the recognition signal is produced."

Woehrl fails to teach or suggest deactivating a device to a stand-by status in response to a period of inactivity of the device, and reactivating the device from the stand-by status when the recognition signal is produced. In rejecting claim 21, the Examiner merely points to the rejection of claim 13. Appellants believe that the Examiner is in error.

In particular, with respect to claim 21, Woehrl cannot go into a stand-by status if such a status would prevent it from responding to an impact. On the other hand, if Woehrl can be regarded as being in a stand-by status until it activates an airbag, there is no teaching of what an active status would be. While an air bag is inflated in response to a trigger signal, the circuit itself merely places the signal TS at the output while the particular conditions that prompt the signal exist. It does not otherwise change condition. The air bag, for its part, cannot return to its previous status, whatever that was. In short, an airbag circuit and a standby circuit are not particularly analogous. Shimizu merely refers to waking a device by shaking, and does not resolve the deficiencies of Woehrl.

Claim 21 is also allowable for reasons previously argued above, with regard to the allowability of claim 13. In particular, there is no motivation to combine Woehrl with Shimizu, because Shimizu does not offer any teachings not already found in Woehrl, and because Woehrl rejects and teaches away from the modifications that would be necessary to meet the limitations of claim 21. Additionally, the proposed modifications would render Woehrl unsuitable for its intended purpose, and would change its principle of operation.

For these reasons, claim 21 is allowable, together with dependent claim 22.

5. Claim 30

Claim 30 recites "producing the first recognition signal at an output terminal".

A combination of Woehrl and Shimizu fails to teach of suggest this limitation of claim 30. Its rejection is therefore in error.

The allowability of claim 30 will be evident on the basis of a review of the arguments submitted in support of claim 13.

G. Rejection of claim 9 under 35 U.S.C. §103(a) over Woehrl, in view of APA and Shimizu.

1. Claim 9

Claim 9 recites, in part, "first comparison means … supplying a reactivation signal at the output terminal when only a first one of said acceleration signals is greater than a respective upper threshold, and supplying the reactivation signal at the output terminal when only a second one of said acceleration signals is greater than a respective upper threshold; and second comparison means … for supplying said reactivation signal at the output terminal when any two of said acceleration signals are each greater than a respective lower threshold, which is smaller than the respective upper threshold. A combination of Woehrl, in view of APA and Shimizu fails to teach or suggest these limitations. The rejection of claim 9 is therefore in error.

While the scope of claim 9 is not identical to that of the previously argued claims, its allowavbility will be clear on the basis of the arguments submitted above in support of claims 1, 31, and 13.

H. Rejection of claims 19 and 20 under 35 U.S.C. §103(a) over Woehrl, in view of Shimizu and Ishiyama.

1. Claim 19

Claim 19 recites that "the portable electronic apparatus is a cell phone." Neither Woehrl nor Ishiyama teach or suggest this limitation.

2. Claim 20

Appellants believe that claim 20 is allowable as depending from an allowable base claim.

I. Conclusion

In summary, Appellants submit that claims 1-24, and 28-31 are patentable over the art of record because the prior art references do not teach or suggest, either individually or in combination, all of the limitations of the respective claims. Appellants therefore respectfully request a speedy and favorable decision.

Respectfully submitted,
SEED Intellectual Property Law Group PLLC

/Harold H. Bennett II/
Harold H. Bennett II
Registration No. 52,404

HHB:lch

701 Fifth Avenue, Suite 5400
Seattle, Washington 98104
Phone: (206) 622-4900
Fax: (206) 682-6031

1644871_1.DOC

VIII. CLAIMS APPENDIX

1. A multidirectional inertial device having a plurality of preferential detection axes, comprising:

inertial sensor means, which are sensitive to accelerations parallel to said preferential detection axes;

transduction means, coupled to said inertial sensor means and supplying a plurality of acceleration signals, each of which is correlated to an acceleration parallel to a respective one of said preferential detection axes;

first comparison means, connected to said transduction means and supplying a first recognition signal when only a first of said acceleration signals is greater than a respective upper threshold and supplying the first recognition signal when only a second of said acceleration signals is greater than a respective upper threshold; and

second comparison means, connected to said transduction means and to said first comparison means for supplying said first recognition signal when any two of said acceleration signals are each greater than a respective lower threshold, which is smaller than the respective upper threshold; and

wherein the first comparison means supply the first recognition signal when an absolute value of a first one of said acceleration signals is greater than the respective upper threshold, and when an absolute value of a second one of said acceleration signals is greater than the respective upper threshold, and the second comparison means supply the first recognition signal when the absolute value of any two of said acceleration signals are each greater than the respective lower thresholds.

2. The device according to claim 1 wherein said first comparison means comprise, for each said preferential detection axis, a respective first comparator, which receives the respective one of said upper thresholds and receives the respective one of said acceleration signals, and at least one first logic gate, connected to each first comparator.

3. The device according to claim 2 wherein said second comparison means comprise, for each of said preferential detection axes, a respective second comparator, which receives the respective one of said lower thresholds and receives the respective one of said acceleration signals, and at least one second logic gate, connected to each second comparator.

4. The device according to claim 1 wherein said upper thresholds are equal to one another, and said lower thresholds are equal to one another.

5. The device according to claim 1 wherein the ratio between the upper threshold and the lower threshold corresponding to a same one of said preferential reference axes is substantially equal to $1/\sqrt{2}$.

6. The device according to claim 1 wherein said inertial sensor means comprise at least one micro-electro-mechanical sensor with capacitive unbalancing.

7. The device according to claim 6 wherein said inertial sensor means comprise a micro-electro-mechanical capacitive-unbalance sensor for each of said preferential detection axes.

8. The device according to claim 6 wherein said transduction means comprise:

at least one current-to-voltage converter, connectable to said at least one micro-electro-mechanical sensor;

a subtractor node, having an inverting input and a non-inverting input, the non-inverting input connected to an output of said current-to-voltage converter;

a filter, connected between said output of said current-to-voltage converter and said inverting input of said subtractor node; and

a rectifier, which is connected to an output of said subtractor node and supplies at least one of said respective acceleration signals.

9. A portable electronic apparatus, comprising:

a device for reactivation from stand-by, said device including a multidirectional inertial device that includes:

an output terminal of the device for reactivation from standby;

inertial sensor means, which are sensitive to accelerations parallel to each of a plurality of preferential detection axes;

transduction means, coupled to said inertial sensor means and supplying a plurality of acceleration signals, each of which is correlated to an absolute value of an acceleration parallel to a respective one of said preferential detection axes;

first comparison means, connected to said transduction means and supplying a reactivation signal at the output terminal when only a first one of said acceleration signals is greater than a respective upper threshold, and supplying the reactivation signal at the output terminal when only a second one of said acceleration signals is greater than a respective upper threshold; and

second comparison means, connected to said transduction means and to said first comparison means for supplying said reactivation signal at the output terminal when any two of said acceleration signals are each greater than a respective lower threshold, which is smaller than the respective upper threshold.

10. A method for detecting the state of motion of a device, comprising:

generating a plurality of acceleration signals, each of which is correlated to an absolute value of an acceleration parallel to a respective preferential detection axis;

supplying a first recognition signal at an output terminal when only a first one of said acceleration signals is greater than a respective upper threshold;

supplying the first recognition signal at the output terminal when only a second one of said acceleration signals is greater than a respective upper threshold; and

supplying the first recognition signal at the output terminal when any two of said acceleration signals are each greater than a respective lower threshold, which is smaller than the respective upper threshold.

11. The method according to claim 10 wherein said higher thresholds are equal to one another, and said lower thresholds are equal to one another.

12. The method according to claim 10 wherein the ratio between the upper threshold and the lower threshold corresponding to a same one of said preferential reference axes is substantially equal to $1/\sqrt{2}$.

13. A device, comprising:

a portable electronic apparatus configured to go into stand-by after a period of inactivity and to return to an active state when a first recognition signal is produced at an output terminal, including:

an acceleration circuit configured to produce a dynamic acceleration signal corresponding to a level of acceleration in each of a plurality of detection axes;

a comparator circuit for each of the detection axes, configured to compare the respective dynamic acceleration signal with respective higher and lower threshold signals; and

a logic circuit configured to produce a first recognition signal at the output terminal if the dynamic acceleration signal of only a first one of the plurality of detection axes exceeds its respective higher threshold, if the dynamic acceleration signal of only a second one of the plurality of detection axes exceeds its respective higher threshold, and if the dynamic acceleration signals of any two of the plurality of detection axes exceed their respective lower thresholds.

14. The device of claim 13 wherein the acceleration circuit comprises:

a sensor configured to sense acceleration in each of the detection axes; and

a transduction circuit for each of the detection axes, each transduction circuit configured to receive from the sensor an acceleration value corresponding to a level of acceleration in the respective one of the detection axes and to produce the respective dynamic acceleration signal.

15. The device of claim 14 wherein each of the transduction circuits is configured to subtract, from the respective acceleration value, a respective static acceleration value, thereby producing the respective dynamic acceleration signal.

16. The device of claim 14 wherein the sensor comprises a micro-electro-mechanical capacitive-unbalance sensor for each of the plurality of detection axes.

17. The device of claim 13 wherein the acceleration circuit comprises:

a sensor configured to sense acceleration in each of the detection axes; and

a transduction circuit configured to receive from the sensor an acceleration value corresponding to a level of acceleration in each of the plurality of detection axes, sequentially, and to produce, for each detection axis, its respective dynamic acceleration signal.

18. The device of claim 13 wherein the number of detection axes is two.

19. The device of claim 13 wherein the portable electronic apparatus is a cell phone.

20. The device of claim 13 wherein the portable electronic apparatus is a portable computer.

21. A method, comprising:

sensing acceleration of a device in each of a plurality of axes;

comparing respective levels of the acceleration in the axes with a high threshold;

comparing the respective levels of the acceleration in the axes with a low threshold;

producing a first recognition signal if the level of the acceleration with respect to only a first one of the plurality of axes exceeds the high threshold;

producing the first recognition signal if the level of the acceleration with respect to only a second one of the plurality of axes exceeds the high threshold;

producing the first recognition signal if the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold;

deactivating a device to a stand-by status in response to a period of inactivity of the device; and

reactivating the device from the stand-by status when the recognition signal is produced.

22. The method of claim 21 wherein each of the plurality of axes lies at right angles to each other.

23. The apparatus of claim 9 wherein each of the plurality of preferential detection axes are mutually orthogonal.

24. The apparatus of claim 9 wherein the plurality of preferential detection axes comprises first and second axes lying perpendicular to each other.

25-27. (Canceled)

28. A device, comprising:

an acceleration circuit configured to produce a dynamic acceleration signal corresponding to a level of acceleration in each of a plurality of detection axes;

a comparator circuit for each of the detection axes, configured to compare the respective dynamic acceleration signal with respective higher and lower threshold signals; and

a logic circuit configured to produce a first recognition signal at an output terminal if the dynamic acceleration signal of only a first one of the plurality of detection axes exceeds its respective higher threshold, if the dynamic acceleration signal of only a second one of the plurality of detection axes exceeds its respective higher threshold, and if the dynamic acceleration signals of any two of the plurality of detection axes exceed their respective lower thresholds; and

wherein the comparator circuit for each of the detection axes is configured to compare an absolute value of the respective dynamic acceleration signal with the respective higher and lower threshold signal.

29. A method, comprising:

sensing acceleration of a device in each of a plurality of axes;

comparing respective levels of the acceleration in the axes with a high threshold;

comparing the respective levels of the acceleration in the axes with a low threshold;

producing a first recognition signal if the level of the acceleration with respect to only a first one of the plurality of axes exceeds the high threshold;

producing the first recognition signal if the level of the acceleration with respect to only a second one of the plurality of axes exceeds the high threshold;

producing the first recognition signal if the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold; and

wherein:

the step of producing the first recognition signal if the level of the acceleration with respect to any of the plurality of axes exceeds the high threshold comprises producing the first recognition signal if an absolute value of the level of the acceleration with respect to any one of the plurality of axes exceeds the high threshold; and

the step of producing the first recognition signal if the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold comprises producing the first recognition signal if an absolute value of the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold.

30. The method of claim 21 wherein:

the step of producing a first recognition signal if the level of the acceleration with respect to only a first one of the plurality of axes exceeds the high threshold comprises producing the first recognition signal at an output terminal;

the step of producing the first recognition signal if the level of the acceleration with respect to only a second one of the plurality of axes exceeds the high threshold comprises producing the first recognition signal at the output terminal; and

the step of producing the first recognition signal if the level of the acceleration with respect to any two of the plurality of axes exceeds the low threshold comprises producing the first recognition signal at the output terminal.

31. The device of claim 1, comprising an output terminal of the multidirectional inertial device, and wherein the first and second comparison means are each configured to supply the first recognition signal at the output terminal.

32-33. (Canceled)

IX. EVIDENCE APPENDIX

There are no evidence appendices.

X. <u>RELATED PROCEEDINGS APPENDIX</u>

There are no related proceedings appendices.

1644871_1.DOC